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MECHANICS.

89. Proposed by GUY B. COLLIER, Schenectady, N. Y.

Assuming that the Northern Pacific R. R. tracks between Fargo and Bismark (North Dakota) to lie on the 47th parallel of latitude; also that the Limited Express weighs 300 tons, and that a speed of 60 miles per hour is maintained between the two places; find the difference between the vertical pressures on the rails of the Express east and the Express west.

90. Proposed by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

Adopting the hypothesis that the planets were originally all one mass revolving about a fixed center and were formed by an explosion of this mass at some point in its path; prove that, if the law of nature were that force varies directly as the distance, the planets would all have collided again simultaneously, and find an expression for the time between the explosion and collision.

*** Solutions of these problems should be sent to B. F. Finkel not later than June 10.

DIOPHANTINE ANALYSIS.

80. Proposed by M. A. GRUBER, A. M., War Department, Washington, D. C.

Find three square numbers whose reciprocals form an arithmetical progression.

*** Solutions of this problem should be sent to J. M. Colaw not later than June 10.

AVERAGE AND PROBABILITY.

73. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

On an average 1 vessel out of every n is wrecked. Find the chance that out of m vessels expected p at least will arrive safely.

74. Proposed by F. ANDEREGG, A. M., Professor of Mathematics, Oberlin College, Oberlin, Ohio.

From a point in the circumference of a circular field a projectile is thrown at random with a given velocity which is such that the diameter of the field is equal to the greatest range of the projectile. Find the chance of its falling into the field. [From Byerly's *Integral Calculus*, page 209].

*** Solutions of these problems should be sent to B. F. Finkel not later than June 10.

MISCELLANEOUS.

77. Proposed by T. E. COLE, Columbus, Ohio.

It is said that a base-ball pitcher throws curves. Give a scientific explanation of how it is done.

78. Proposed by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

The center of a regular polygon of n sides moves along a diameter of a given circle, the plane of the polygon being perpendicular to the diameter, and its magnitude varying